

**From:** [PETERSON Jenn L](#)  
**To:** [Eric Blischke/R10/USEPA/US@EPA](#); [POULSEN Mike](#)  
**Subject:** RE: Bioaccumulative sediment criteria for Copper  
**Date:** 12/05/2006 12:03 PM  
**Attachments:** [copper synthesis setac 2006 poster.pdf](#)

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Eric,

Copper bioaccumulates but would not be expected to biomagnify up the food chain. This is because of the regulation that occurs in fish tissue would not allow it to accumulate to high enough levels that wildlife feeding on the fish would be at risk. That is why it was not include in our bioaccumulation guidance. As for DEQ's bioaccumulation number in the JSCS, it is based on the DEQ 2001 sediment numbers put together by Bruce H. This was based on an allowable water concentration for a representative piscivorous bird (GBH). It just takes the acceptable water conc. for water and food consumption (assuming some bioaccumulation using a food chain multiplier) and converts it to a sediment number using Koc / Kow relationships. Therefore, it is based on the theoretical partitioning and does not consider metals regulation by fish.

This does not mean, however, that copper does not accumulate in invertebrate tissue resulting in effects either in the inverts themselves when a threshold level is reached, or on fish or wildlife feeding on invertebrates with accumulated residues. In Portland Harbor, we are getting at this pathway for inverts by looking at clam tissue residues and comparing them to TRVs and for fish we are looking at the dietary line of evidence.

However, copper is well known for its ability to interfere with osmoregulatory function in salmonids, as well as act as a direct gill toxicant in water. Water concentrations compared to TRVs are very important for evaluating these effects. Copper toxicity of the gill has been well studied on fathead minnow and rainbow trout, and has been used as the poster child to derive and validate the biotic ligand model for EPA.

I would think cleanup would be driven by accumulation into clam tissue (and effects on clams themselves or fish dietary analysis) and any water exceedences (transition zone water or surface water). I am not sure where this occurs as of yet, but I would say the analysis of the clam data will be very important as well as the water data.

I am attaching a paper from a colleague at NOAA who has been working on copper effects in fish if you are interested.

I hope this helps-

Jennifer

-----Original Message-----  
From: [Blischke.Eric@epamail.epa.gov](mailto:Blischke.Eric@epamail.epa.gov)  
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Sent: Tuesday, December 05, 2006 10:57 AM  
To: PETERSON Jenn L; POULSEN Mike  
Subject: Bioaccumulative sediment criteria for Copper

I have a question about copper. Table 3-1 of the JSCS provides a bioaccumulative screening level for copper of 10 ppm. However, no value is provided for copper in the recent bioaccumulative guidance. Does copper bioaccumulate? The PEC for copper is 149 ppm, the TEC is 31.9 ppm. Would we expect sediment cleanup levels to be based on some sort of bioaccumulative relationship or direct effects on the benthic community or something else?

Any thoughts on this would be appreciated.

Eric